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ABSTRACT

This report provides a brief review of Beginning Teacher Evaluation Study (BTES) documents from Phase II and Phase III-A, including responses from researchers suggesting variables for future BTES research. Seven basic observable classroom variable domains have been found to receive support from several of the BTES sources reviewed. These seven variable domains are: the quantity of academic instruction received by the student; the strength of the academic orientation of instruction; the extent to which instruction is tailored to the needs of individual students, the clarity of instructional communication; the teacher's instructional involvement and contact with students; student attention to the academic task; and the existence of a positive, family-like classroom atmosphere. It was also concluded that variables related to information processing by the teacher make up a domain of nonobservable classroom variables. In addition, several methodological implications of the research reviewed were discussed. (Author)

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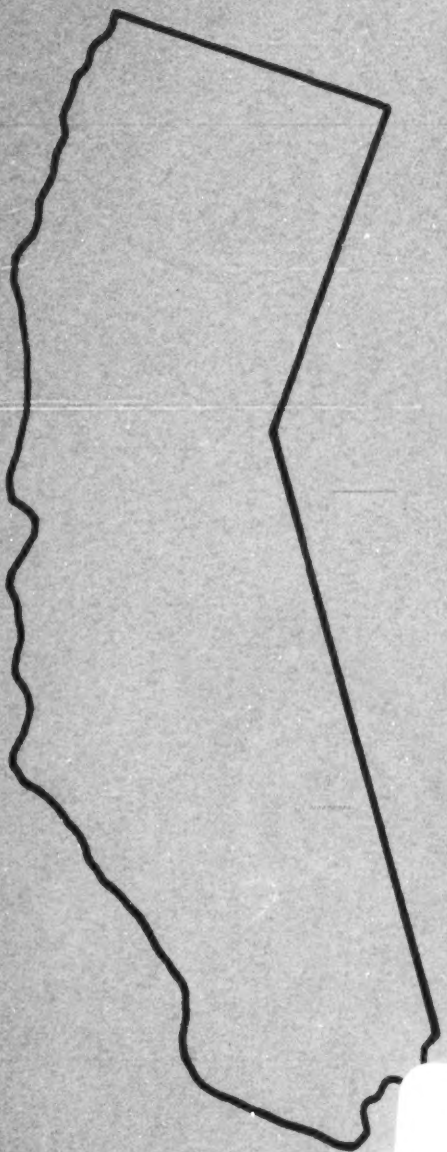

BTES

BEGINNING TEACHER EVALUATION STUDY

Technical Report Series

Technical Report I-2

OBSERVABLE CLASSROOM VARIABLES

Richard S. Marliave

July, 1976

U.S. DEPARTMENT OF HEALTH EDUCATION & WELFARE NATIONAL INSTITUTE OF EDUCATION

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Technical Report I-2

OBSERVABLE CLASSROOM VARIABLES

by

Richard Marliave

July, 1976

Introduction

The purpose of this Technical Report is to identify domains of observable classroom variables that appear promising for Phase III-B of the Beginning Teacher Evaluation Study (BTES). These variables have been culled from the results of Phase II and Phase III-A of BTES. "Observable classroom variables" refers here, to those variables related to the instructional process that can be assessed in ongoing classrooms using observational techniques of data collection. A brief review of results will be presented for each of the following reports: The Phase II Report (McDonald, Elias, Stone, Wheeler, Lambert, Calfee, Sandoval, Ekstrom, & Lockheed, 1975), Special Study A (Tikunoff, Berliner, & Rist, 1975), Special Study B (Morine, & Vallance, 1975), and Special Study C (Morine & Vallance, 1976). Brief reviews will also be provided for related information from Technical Report 75-10-4 (Joyce, 1975) and Technical Report 75-4-2 (Shavelson & Dempsey, 1975). In addition, summaries will be provided of the variable candidates that researchers, nationally-known for their studies of teaching, submitted to BTES during Phase III-A. Following these reviews of Phase II and Phase III-A variables, a summary list of variables will be provided, integrating the findings from Phase II and Phase III-A. These variables are considered by the BTES staff to be the most promising candidates for research efforts to be conducted during Phase III-B.

It should be emphasized that the variables to be identified here are "promising candidates" for future research, rather than the conclusive findings of previous research. It is commonly recognized that the field

of research on teaching is rife with methodological complications and substantive ambiguities. (See Berliner, 1975). The BTES research reviewed here is no exception to this history. It is not the purpose of this report to enumerate the complications and ambiguities of the research reviewed. Rather, it is intended that the major findings of this research be summarized, recognizing that these findings are tentative and should be examined further in future studies. The research reviewed here was exploratory. The findings of that exploration should guide future research, providing a somewhat sharper focus and an increasing likelihood of consistent and persuasive conclusions.

Phase II Variables

Phase II findings will be considered here in terms of four categories of variables: 1) teacher behaviors, 2) student behaviors, 3) teacher characteristics, and 4) student characteristics. The largest number of variables suggested by the Phase II findings is in the category of teacher behaviors. The finding that the quantity of the teacher's daily preparation for instruction is unrelated (probably even negatively related) to student learning suggests that the quality of a teacher's preparation may be the more important variable. It was also found that the teacher's direct involvement in instruction is related to greater student learning. There was some indication, though not conclusively, that individualization of instruction (assuming a constant level of direct teacher involvement) is related to higher student learning outcomes. The use of greater variety of materials was usually, though not always, related to lower levels of student learning. This may be due to a detraction from the structure and focus of instruction associated with a greater variety of materials. Management behaviors were associated with both positive and negative outcomes. It may be important to distinguish between management behaviors that are the result of the teacher's general task orientation and those that are the teacher's response to an immediate behavioral disorder in the classroom. The quantity of time devoted to reading and mathematics instruction was positively related to student learning in those areas. In addition, the range of content areas covered in mathematics was positively related to mathematics achievement growth. Higher levels of focus and goal-directedness manifested in instruction were associated with greater student learning. Instructional responses of the teacher to

students where there was a direct informational component (as opposed to asking questions or leading a discussion) were associated with higher student learning outcomes.

The major finding for student behaviors was a relationship between inattention and lower learning outcomes. However, there was no consistent relationship between student attention or productivity and student learning. Other features of student task involvement, such as the difficulty of the task for the student, may account for these unexpected results. It was also found that the presence of the teacher was associated with increased student attention to the task.

The most promising domain of teacher characteristics was teacher aptitude. Flexibility and field independence seemed to be the most important aptitude variables. Teacher attitudes, especially aspirations, did show a moderate relationship with teacher behavior.

Some important methodological implications can be drawn from the Phase II findings. It was suggested that variable domains should be conceptualized in terms of patterns of behavior that have functional relationships within the instructional process. It was also suggested that observation should cover as much of the school day as possible, sampling days at frequent intervals throughout the term of the study.

Special Study A Variables

Sixty-one (61) variables were shown by Special Study A to be related to teacher effectiveness in one or more of the grade-by-subject matter quadrants (second and fifth grades, reading and mathematics). Of these, twenty-one (21) were related to teacher effectiveness in all four quadrants. These variables were reported in four categories: classroom climate, teacher instructional moves, teacher behavior control moves, and teacher characteristics. There were six classroom climate variables

related to teacher effectiveness in all four quadrants:

1. Adult involvement (adults other than the teacher are allowed to instruct),
2. Conviviality (warmth, family-like quality to classroom interaction),
3. Cooperation (students cooperate with other students and the teacher),
4. Defiance (negative) (a student's open resistance to teacher direction),
5. Engagement (students express eagerness to participate; appear actively and productively involved in learning activities), and
6. Promoting self-sufficiency (teacher encourages students to take responsibility for their own classwork).

Eight teacher instructional move variables were related to effectiveness in all four quadrants:

1. Abruptness (negative) (unanticipated "switching" by the teacher between instruction and classroom or behavior management),
2. Attending (the teacher actively listens to a student),
3. Filling time (negative) (the teacher fills "empty" time periods with "busy work"),
4. Illogical statements (negative) (the teacher makes a statement whose consequences would be ridiculous if carried out),
5. Monitoring learning (the teacher checks in on a student's progress regularly and adjusts instruction accordingly),
6. Pacing (the teacher appears to perceive the learning rate of students and adjusts the teaching pace accordingly),
7. Spontaneity (the teacher capitalizes instructionally on unexpected incidents that arise during class time), and
8. Structuring (the teacher prepares students for the lesson by reviewing, outlining, explaining objectives, and summarizing).

Three teacher behavior control move variables were related to effectiveness in all quadrants:

1. Belittling (negative) (the teacher berates a child in front of others),
2. Consistency of message for control (the teacher gives a direction or a threat and follows through with it), and
3. Oneness (negative) (the teacher treats the whole group as a "one" often in order to maintain peer control).

Four teacher characteristic variables were related to effectiveness in all quadrants:

1. Accepting(the teacher reacts constructively to student feelings and attitudes),
2. Knowledge of subject (the teacher seems confident in teaching a given subject and demonstrates a grasp of it),
3. Optimism (the teacher expresses positive, pleasant, optimistic attitudes and feelings), and
4. Recognition seeking (negative) (the teacher calls attention to him/herself for no apparent instructional purpose).

It was concluded that one of the most important characteristics of the classroom is a family-like quality that produces warmth and cooperation. At least five of the variables listed above are closely tied to this family-like quality: conviviality, cooperation, defiance (negative), belittling (negative), and accepting. It is especially interesting that this cluster of variables proved to be so important in Special Study A, where reading and mathematics achievement of students was the sole criterion of teacher effectiveness. This suggests that the authoritarian, task-master approach to instruction is unnecessary (perhaps even disadvantageous) for maximizing student academic achievement outcomes. Rather, a pleasant learning environment appears to be academically productive.

Two methodological implications of Special Study A are relevant to observation procedures. First, it is clear that the procedure of rating observed classrooms, rather than relying entirely upon observational category coding systems, is a useful approach to the study of teaching. All of the Special Study A variables were based upon rating of observed classrooms. The fact that twenty-one (21) of them were related to teacher effectiveness at both grade levels and in both subject matters would suggest that rating procedures do tap some of the most crucial aspects of instruction. A second methodological implication of Special Study A is that large amounts of observation are useful and may be necessary in the study of teaching. Special Study A obtained one full week of observational data in each classroom studied. Observers collected data throughout the entire school day, focusing on reading and mathematics instruction but observing all other activities as well. The success of this approach for Special Study A would suggest that extensive observation should be used in future studies of teaching.

Special Study B Variables

Special Study B examined teacher perceptions of classroom interaction and interactive decision making, as well as student perceptions of instruction. The major finding of Special Study B is that more effective teachers were more cognitively oriented in their perceptions of instructional interaction. The more effective teachers emphasized cognitive aspects of student behavior, as when grouping students for a sort task, whereas the less effective teachers emphasized affective aspects. In addition, the more effective teachers appeared to show a more complex level of cognitive processing than did the less effective

teachers. The more effective teachers used more unique and more situational rather than categorical bases for sorting pupil responses that had occurred during a lesson. They also used more single element groups when sorting student characteristics. These findings suggest that the more effective teacher process information on students at a complex cognitive level, taking many factors into account simultaneously so that situations and individual students are often thought of as unique. These teachers tend to avoid more simplistic generalizations. It is also interesting to note that the more effective teachers required more information before judging instruction viewed on videotape, whereas the less effective teachers referred to more information during stimulated recall of their instructional decisions. This suggests that it is the processing of more complex information, rather than the storage (memory and recall) of more information that distinguishes the more effective teachers.

Two additional Special Study B findings are of interest. The more effective teachers emphasized student academic performance, while the less effective teachers emphasized student behavior during academic tasks (participation and attention). It was also found that students tended to emphasize the kinds of information emphasized by the more effective teachers. Both students and the more effective teachers emphasized cognitive aspects of instruction and characteristics of the instructional process.

Special Study C Variables

Special Study C examined variables related to teacher planning. The results confirmed the major Special Study B finding, showing that more effective teachers attend to cognitive aspects of instruction more so than do less effective

teachers. In a finding related to the Special Study B results on complex cognitive processing, it was shown that more effective teachers tend to seek information and reach conclusions regarding planning with more specific questions and statements, whereas less effective teachers are more inclined to make general questions and statements.

Several other interesting findings came out of Special Study C. It was found that more effective teachers do not obtain higher scores on tests of diagnostic skills than less effective teachers. No difference was found using a simulation task of reading diagnosis. Surprisingly, the less effective teachers achieved higher scores on a videotape test of diagnostic skills in reading. This videotape test had been used in Phase II of BTES, with the same results. These replicated findings are difficult to interpret, but they do suggest that diagnostic skills may be difficult to measure in relationship to learning outcomes. A related Special Study C finding was that the reading assignment errors (presumably due to diagnostic or prescriptive errors) of more effective teachers tend to involve placing students at too high a reading level, whereas the errors of less effective teachers involve placement at too low a level. Hence, although the more effective teachers may not show superior diagnostic skills, their errors reflect a positive or optimistic view of student performance. This may also suggest that more effective teachers hold higher expectations for their students. Some support for this is reflected in the finding that the more effective teachers expected their students be become more independent (of the teacher) over the course of the school year.

One additional Special Study C finding was that more effective teachers tend to emphasize the instructional process rather than instructional content

when they conduct lesson planning. This confirms the Special Study B finding that more effective teachers emphasize instructional process. Related to this is the Special Study C finding that more effective teachers do not use as great a variety of instructional materials as do less effective teachers. In addition, the more effective teachers prepare fewer work sheets for reading instruction. These findings suggest that the more effective teachers concentrate on a limited set of curricular materials, providing a consistent focus on the instructional process that underlies those materials.

Methodologically, the findings of both Special Study B and Special Study C are not readily amenable to observational data collection techniques. Observation is useful for the study of classroom characteristics and events. It is not useful for the study of preactive teacher behaviors that occur outside of the classroom, such as teacher perceptions of instruction and teacher planning for instruction as examined in Special Studies B and C. Therefore, the findings discussed above suggest that other data collection procedures, such as interviews and questionnaires, should be administered to assess teacher perceptions and planning. The consistent findings for cognitive emphasis and specificity are particularly supportive of the use of other data collection procedures, in addition to observation.

Variables from the Bruce Joyce Literature Review

Technical Report 75-10-4 (Joyce, 1975) reviews literature relevant to variables and observation procedures that show promise in the search for teacher effectiveness. Important conclusions were reached in several areas. One of the more innovative suggestions of this report was that the dymanics of the classroom must be investigated for their "pull" on the teacher. That is, student behavior and the characteristics of the class as a whole

influence the behavior of teachers, just as teacher behavior influences students and class characteristics. Three classroom dynamics variables recommended by the report for future research are cohesiveness, affirmativeness, and task orientation.

A second variable domain reviewed by Joyce is the role of curriculum methods, materials, activities, and outcomes as they relate to teacher effectiveness. The report places a great deal of emphasis upon the role of curriculum and the related variables that should be examined in the study of teaching. It is suggested that the curriculum-dependence of the teacher should be considered. This is essential to an understanding of decision-making process that underlies the teacher's instructional approach. Furthermore, if it is found that a given teacher relies heavily on an existing curriculum, then an examination of that curriculum will provide extensive information on the instructional process followed by the teacher. The report also suggests that the curriculum materials used should be considered in relationship to the instructional process. In addition, the particular learning tasks provided for students should be examined in relationship to specific outcomes and individual learners. This suggests that observation should record the relevant content outcome for the learning activities of individual students. The report also suggests that patterns of instructional activity should be related to specific outcomes.

Variables from the Report on Generalizability

Technical Report 75-4-2 (Shavelson & Dempsey, 1975) examines the generalizability of different measures of the instructional process. Two

conclusions are particularly important to the identification of variables for observations. First, it was found that assessments of the effects of instruction do not usually generalize across content areas. That is, instruction that is effective for one content outcome may be ineffective for another. Therefore, observation should record the content area of ongoing instruction. This supports the Joyce report conclusion that learning tasks should be examined in relationship to specific outcomes.

A second conclusion relevant here is that global ratings provide the most generalizable observational data. This would suggest that rating procedures should be included among the observation instruments used to study teaching. The report also points out that the low consistency of frequency count data may be due to the restricted range that occurs when infrequent variables are observed. This suggests that observation should include long periods of time when the frequency of a variable's occurrence has a direct impact on the likelihood that the observational procedure used will detect that variable.

Variables Proposed by Researchers in Teacher Education

As part of the Phase III-A BTES activities, a letter was sent to several researchers, nationally-known for their studies of teaching. It was requested that they recommend teacher behavior variables that might be included in future BTES observation instruments. Responses were received from six researchers. These are summarized briefly below. No prior BTES document reports the research upon which the responses are based. Therefore, some information is included on the procedures used for this research, in addition to information on the variables identified.

Gary Borich and Dick Calkins: Findings were reported for data collected in fifth-grade classrooms using the Global Rating Scales (GRS) developed by Borich. Two variables seemed to be related to learning growth in mathematics using regression analyses to determine the additional variance in posttest scores accounted for by each variable when entered after pretest. These variables are Classroom Environment and Clarity. Each accounted for 5% of the variance of posttest scores after adjustment by pretest scores. Correlations with mathematics gain scores also showed these two variables to be positively related to achievement growth.

Classroom Environment refers to the characteristics of the physical classroom environment. A "high quality" Classroom Environment is supportive of learning, using a variety of resources to heighten the learning experience for pupils. Clarity refers to the teacher's ability to communicate at the pupil's level of comprehension.

N. L. Gage and Penelope Peterson: Teacher behavior was manipulated in an experiment to produce bimodal distributions (high/low) of each of three variables: Structuring, Soliciting, and Reacting. Observation was conducted during a two-week teaching period, assessing levels of Structuring, Soliciting, Reacting, and the length of lessons (time on task). A posttest was given immediately after the two-week period to measure learning of the ecology facts and concepts taught. Retention measures were administered three weeks later. Achievement measures were adjusted using a vocabulary test that had been administered before the two-week teaching period. Attitude posttest scores were adjusted with attitude pretest scores.

Structuring involved reviewing main ideas and facts, stating objectives, outlining the lesson, signaling transitions, indicating important points, and summarizing. High Soliciting involved asking a relatively large proportion of higher-order questions, approximately 60% higher-order and 40% lower-order. Low Soliciting consisted of approximately 15% higher-order and 85% lower-order questions. In addition, high Soliciting included waiting in silence for three seconds or more after a teacher question or student response, while low Soliciting included waiting less than three seconds. High Reacting involved relatively greater use of explanation and feedback, use of student ideas, and praise when interacting with students. (Low Reacting involved the converse.)

Zero-order correlations were reported for the observation variables and student outcome measures. The only significant correlations with adjusted multiple-choice posttest scores were for Soliciting (higher and lower-order questions), where lower-order questions were positively related, higher order questions were negatively-related, and the proportion of higher to lower-order questions was negatively-related. Total Structuring behaviors showed a low positive correlation. High Reacting was low positive, while low Reacting was low negative in correlation with the adjusted multiple-choice posttest. The proportion of high Reacting to total Reacting was positively related. No significant correlations were found with adjusted essay scores.

Zero-order correlations with adjusted multiple-choice retention scores showed higher-order questions and low Reacting behaviors to be negatively correlated, both significant. No other correlations were significant, but the direction (sign) of the other correlations for multiple-choice retention was in all cases the same as that for the immediate posttest score correlations mentioned above. Adjusted essay retention scores were negatively correlated

with low Reacting behaviors, positively correlated with high Reacting behaviors, and positively correlated with the proportion of high to low Reacting behaviors (all significant). No other correlations with adjusted essay retention scores were significant.

Analysis of variance showed a significant Structuring by Reacting interaction for multiple-choice retention scores. Low Structuring and low Reacting in combination were lower in outcome than any of the other three combinations of high or low Structuring and Reacting.

In summary, the results for immediate posttest and retention scores were generally consistent for both multiple-choice and essay outcomes. The strongest relationships were found for Soliciting and Reacting, with lower-order questions having positive effects, higher-order questions having negative effects, high Reacting behaviors having positive effects, and low Reacting behaviors having negative effects.

Thomas Good: General conclusions were offered based on a study conducted at the fourth grade level using mathematics outcomes (Good and Grouws, 1975). Two factors seemed to be positively related to growth in mathematics achievement. These were student initiated behavior and student access to immediate teacher feedback. However, it was suggested that student initiated contact might not be strongly related to achievement in classes where teachers provide self-check devices to insure regular monitoring and feedback even when students do not initiate contact.

Generally, it was concluded that single behaviors are not nearly so important as patterns of behavior. Furthermore, both the report on the

fourth grade mathematics study (Good and Grouws, 1975) and an article cited by Good (Good and Power, 1976) conclude that the effectiveness of different teachers varies according to the type of student receiving instruction. It is concluded that no single instructional mode is superior for all students in all contexts and that teachers should use a variety of instructional settings, trying to optimize the effectiveness of instruction provided for different students.

The Good and Grouws (1975) report cites six patterns of effectiveness:

1) student initiated behavior as a means of enhancing the monitoring process so that feedback and explanation will be more appropriate,
2) whole class instruction,
3) general clarity of instruction and the availability of information as needed (process feedback in particular),
4) a non-evaluative and generally relaxed learning environment,
5) relatively high achievement expectations, and
6) classrooms that are relatively free of major behavior disorders.

Robert Peck: Conclusions were reported for a study involving data collected from anecdotal reports and twenty-eight rating scales. The twenty-eight rating scales were used to produce three factors: Kindly and Understanding, Systematic and Organized, and Stimulating and Imaginative.

No main effects were found for any of the three teacher-factors for either achievement or self-esteem outcomes. However, some interactions were significant. Kindly and Understanding interacted with peer ratings

of student academic orientation. Students with average or low academic orientation showed their lowest achievement with Kindly and Understanding teachers, while students of higher academic orientation showed their highest achievement gains with the same teachers. There was also an interaction effect for achievement outcomes due to pre-test by student emotional adjustment by Stimulating and Inventive teacher. In addition, all three teacher factors showed interaction effects for student self-esteem outcomes, where teacher factors interacted with such student variables as ethnicity.

The major conclusion, here, is that research must examine the teacher's effect on the individual student, because individual teachers or teacher characteristics will not have uniform effects on all the students in a class.

Of the three teacher factors, Peck expresses the "hunch" that Systematic and Organized is the most important for achievement gains.

Robert Soar: Most of the conclusions discussed here are based on a report by Soar and Soar (1973) that includes the results of a series of sub-studies. Generally, it was concluded that the two variables most highly associated with achievement gain (at grades one and five) are Pupil Evaluation of Work and Pupil Interest-Attention. The first refers to the teacher witholding evaluation of student work and the teacher asking the student to evaluate work or answer a question. The second refers to ratings of student interest and attention to task. It was also concluded that the distinction between teacher management of student task and teacher management of student behavior is a crucial one for research on teaching.

Many more detailed findings are reported. Generally, it can be said that the findings indicate that interaction effects and non-linear relationships should be anticipated in research on teaching. The most important student characteristic for interaction effects was socioeconomic status (SES). Several SES interactions are discussed. Negative affect was associated with small positive gains for high SES students and moderate negative gains for low SES students at grade five. Similarly, greater use of gentle control of students by the teacher was associated with lower gains for high SES students and higher gains for low SES students at grade one. Also, the teacher asking difficult questions was associated with lower gains for low SES students than for high SES students at grade one.

Interactions were also found for other student characteristics and teaching behaviors. For example, seatwork without the teacher was associated with higher gains for highly motivated students and lower gains for less motivated students. Also, teacher choice of problem (determination of task) and activities of a higher cognitive level showed an interaction effect for reading gain at grade five. It was suggested that when the teacher chooses the task, then the teacher may tend to be more insensitive to student cues indicating that the task is excessively difficult. Excessive difficulty would be more likely with activities of a higher cognitive level. However, when the student chooses the task, he/she may tend to identify tasks at a difficulty level he/she can cope with, even when the cognitive level of the task is high.

Non-linear relationships are also discussed. One that was consistent for both grade five (Soar and Soar, 1973) and grade one (Soar and Soar, 1972) is a non-linear association of recitation patterns of instruction and achievement gains, where the highest achievement gains were associated

with moderate use of recitation. The recitation pattern referred to here involves brief, drill-like interactions, often student initiated, where the teacher provides immediate feedback as to whether or not a student response is correct.

It should be noted that some main effects were reported. For example, a consistent pattern was found (Soar and Soar, 1972) where activities of a low cognitive level were associated with positive achievement gains at grade one, while activities of a high cognitive level were associated with negative gain.

Jane Stallings: Findings of the Follow Through Observation Study for reading achievement at grades one and three were discussed. Grouping patterns were found to be important, with small group instruction (nine or fewer students) being relatively more effective at grade one and large group instruction (more than nine) more effective at grade three. This was not only found for data on group size itself, but for variables that are probably surrogates for group size. For example, teacher movement and questions about the subject, both of which tend to occur in large groups, were associated with positive grade three outcomes. Interestingly, individual student instruction was negatively associated with outcomes at grades one and three. It is concluded that group size should be examined further, differentiating between the following categories: one student, two, three to eight, nine to fifteen, and the whole class.

Relationships were also found for time-related variables. Both the length of the school day and the average amount of time spent in reading instruction were positively associated with outcomes at grades one and three.

Another important cluster of variables was verbal interaction. Total academic verbal interaction, adult academic questions directed to students, and groups of students responding to academic questions were each positively associated with outcomes at grades one and three. Also, praise and acknowledgement were positively associated with grade one outcomes.

Stallings provided a list of variables in estimated order of importance, each of which was generally positive in its relation to reading outcomes. The list follows:

1) Total amount of academic verbal interactions,
2) Amount of time per student spent in reading,
3) All feedback to student responses to questions related to reading or math,
4) Acknowledgement and praise for student's academic achievement,
5) Student responses to academic questions,
6) Adults ask direct questions related to reading,
7) Self instruction,
8) Adult movement,
9) Group size (nine or more students),
10) Communicate focus to group of nine or more,
11) Attending to large group of nine or more children, and
12) Length of school day.

Observable Classroom Variables from Phase II and Phase III-A

The following discussion examines the BTES findings reviewed above (including the contributions solicited from other researchers) in order to identify those variables that show the most promise for future research.

The previous BTES findings are organized below into seven observable classroom variable domains that have been consistently related to student learning. There is also consideration of an important domain of non-observable classroom variables involving information processing by the teacher. In addition, previous BTES findings are examined for their implications regarding observational methodology.

One variable domain that was consistently related to positive student learning outcomes is the sheer quantity of academic instruction received by the student. This includes both the amount of instructional time and the amount of content covered during instruction. The Phase II data showed time in reading and mathematics content areas to be positively related to reading and mathematics achievement. The Stallings data showed the same relationship for reading, where time in reading and the length of the school day were both related to reading achievement. The Phase II results also indicated that the range of reading and mathematics skills covered during instruction was positively related to achievement. In addition, the Joyce report and the Shavelson and Dempsey report both recommend that research on instruction examine the particular areas of reading and mathematics content covered in relationship to the particular reading and mathematics skills for which student learning is demonstrated. It is suggested that instruction in a particular content area should show a stronger and more generalizable relationship to learning in the same content area than it will to learning in other academic content areas.

The strength of the academic orientation of instruction was also positively related to student learning. The findings consistently indicate that instruction clearly and explicitly structured to attain specified academic goals, supported by the teacher's management and the physical

environment of the classroom, is conducive to higher student achievement. Goal-directed, highly structured instruction was positively related with student learning as represented in the data of Special Study A, Gage, Peck, and Stallings. In addition, the use of a variety of instructional materials, which may indicate relatively less focus and structure, was negatively related with student learning in the Phase II and Special Study C reports. It was also found that teachers who spend more time managing the academic task, rather than student behavior, obtain higher levels of student learning. This was supported by Special Study A, the Joyce report, and Soar's findings. The Phase II data also gave some indication that task management is more effective than behavior management, in terms of learning outcomes. In addition, Borich's data indicate that the academic orientation of the physical environment of the classroom, where the physical surroundings are designed to enhance student learning, is positively associated with learning outcomes.

Instruction tailored to the needs of the individual student has also been shown to relate positively with student learning. There was some indication in the Phase II data that individualization of instruction, given a constant level of direct teacher involvement, is related to higher student learning outcomes. The teacher's monitoring of student activities, presumably to determine student needs as they arise, was related to increased student learning in Special Study A and the Stallings data. The provision of feedback and explanation according to student need was found to be important for higher learning outcomes in the data of Gage, Good, and Stallings. Stallings also found that verbal interaction involving the teacher's questions and student responses, where monitoring and feedback according to student need would be enhanced, was associated with increased

levels of learning. In a related finding, Good concluded that the positive effects of student initiated contact with the teacher are probably due to the enhancement of monitoring and feedback that these student contacts would provide. Similarly, Soar's data indicate that the student's evaluation of his own work is positively related to learning. It is likely that student self-evaluation not only induces the student to think more carefully about his own responses, but provides the teacher with more detailed information on how the student arrives at his answers. This would enhance the monitoring and feedback process in relation to the needs of the individual student.

The clarity of instructional communication has also been consistently associated with higher levels of student learning. Borich and Good both report that ratings of clarity are positively associated with student learning. In addition, other research has shown that variables related to clarity have strong effects on student learning. The Phase II report concluded that instructional responses with a direct informational component, rather than asking questions or leading a discussion, are associated with higher learning outcomes. This suggests that the more direct, and therefore more clear, mode of conveying information results in greater student understanding and learning. Special Study A found that knowledge of subject matter and consistency of message (for control) are positively related with learning, while illogical statements are negatively related with learning. Knowledge and consistency should both enhance clarity, whereas illogical statements would reduce clarity. Further support for the importance of clarity to instruction comes from the findings of Gage

and Soar, indicating that lower-order cognitive activities are positively related with learning. Lower-order activities should generally be clearer to the student, primarily as a function of their simplicity.

Another observable classroom variable domain consistently related to learning is the teacher's instructional involvement and contact with students. This is probably interrelated with the adjustment of instruction to individual needs and with clarity (both of which are discussed above). The more that the teacher is involved in the instruction and has contact with students, then the more that he or she can adjust that instruction to the needs of each individual student. In addition, teacher involvement and contact probably increase the teacher's understanding of student problems as well as the teacher's opportunity to provide the explanations necessary to resolve those problems. This, in turn, should enhance the clarity of the instruction for the student. Teacher involvement and contact should also increase student attention to instructional activities, insofar as involvement and contact enhance the monitoring and control of student attention. This, in fact, is suggested by the Phase II data. (Student attention is discussed below.)

Several findings support the importance of teacher involvement and contact. Both Phase II and Special Study A data indicate that the teacher's involvement in instruction is positively associated with student learning. Stallings reports that the amount of verbal interaction of the teacher with the student is associated with higher learning outcomes. This verbal interaction is a manifestation of teacher involvement and contact with students. Good finds that whole class instruction is positively related to learning

outcomes. To the extent that this occurs, it is probably a function of the more pervasive and constant teacher involvement and contact that is possible with whole class instruction.

Student attention to the academic task is another observable classroom variable domain that has been consistently related to higher levels of learning. Both Special Study A results and Soar's findings indicate that student attention is positively associated with learning. The Phase II data indicate that student inattention is negatively associated with learning. Good finds that a lack of behavioral disorders is associated with higher learning outcomes. This lack of behavioral disorders is probably highly related to student attention. Another related finding is the higher learning outcomes of students who show independent work habits. Both Special Study A and the Stallings data show this relationship. In addition, Special Study C found that teachers who obtained higher learning outcomes expected their students to develop independent work habits over the course of the year. It is likely that independent work habits are a reliable indicator of enhanced student attention to the academic task. One other related finding is reported by Soar, wherein teachers who required that students evaluate their own work obtained higher learning outcomes. This student self-evaluation should increase student attention to the academic task. It is probably associated with a more intense and thoughtful processing of task-related information.

The final observable variable domain to be discussed here is the classroom atmosphere. Special Study A indicated that a family-like atmosphere is one of the most crucial instructional variables for enhanced student learning. The Joyce report concludes that the cohesiveness and

affirmativeness of the classroom are important instructional variables. Good finds that a non-evaluative and relaxed learning environment is beneficial to student learning. Thus, both the Joyce and Good conclusions support the Special Study A concept of supportive family-like atmosphere, suggesting that an instructionally effective environment should not be harsh or unpleasant for the student.

In addition to the seven observable classroom variable domains discussed above, variables related to information processing by the teacher make up a domain of non-observable classroom variables. These variables involve covert cognitive activities of the teacher that generally must be assessed with interviews, questionnaires, or tests administered outside of the ongoing classroom. The Phase II findings indicate that the domain of teacher aptitudes, and to a lesser extent, attitudes (such as aspirations), are related to instructional effectiveness. The Phase II findings also indicate that the quality of teacher preparation appears to be more important to student learning than the quantity of teacher preparation. This suggests that information processing variables must be investigated to understand the nature and quality of teacher preparation for instruction. Both Special Study B and Special Study C found that more effective teachers tend to focus on cognitive, rather than affective, considerations. Special Study C also found that teachers who process information with greater specificity generally obtain higher learning outcomes. The Joyce report suggests another information processing variable for further investigation. This is the curriculum dependence of the teacher, involving the extent to which the teacher relies on the curriculum as a source of decision-rules for processing instructional information. One other information processing variable is mentioned by Good, who suggests that high

expectations for student achievement are associated with higher learning outcomes. In related findings, Special Study A indicates that teacher's optimism is positively related with learning and Special Study C indicates that more effective teachers have a more positive view of student performance as shown by reading assignment errors due to high placement of students. Generally then, information processing variables do warrant further investigation, even though they cannot be readily assessed using observation procedures. Therefore, interviews, questionnaires, and/or tests (of teachers) should be added to future BTES instrumentation.

The conclusion above is essentially a methodological one, relevant to instrumentation procedures. Several other methodological implications of the research reviewed here are pertinent to observation procedures. The Phase II report, the Special Study A results, and the Shavelson and Dempsey report indicate that the amount of observation should be maximized. The observation of target students is supported by Joyce, Good, and Peck, each of whom suggest that analyses should be carried out in terms of the individual student. The importance of observing patterns of classroom behavior is emphasized by the Phase II report, as well as by Joyce and Good. One other methodological recommendation is the use of global rating procedures. The Special Study A findings indicate that global ratings are useful for identifying crucial instructional variables, while the Shavelson and Dempsey report points out that these procedures offer relatively high generalizability.

Conclusion

This technical note has provided a brief review of BTES documents from Phase II and Phase III-A, including responses from nationally-known researchers suggesting variable candidates for future BTES research. Seven basic observable classroom variable domains have been found to receive support from several of the BTES sources reviewed. In addition, the information processing domain of teacher variables, generally non-observable, also received support. Finally, several methodological implications relevant to observational procedures were indicated by the sources reviewed. This is a substantial body of findings. They will provide essential guidance in the development of BTES observation instrumentation for Phase III-B.

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